REMARKS

Response To Claim Rejections Under 35 U.S.C. §103

Claims 1-8 were tentatively rejected under 35 U.S.C. §103 as allegedly unpatentable over *Jones* (U.S. Patent No. 5,380,401) in view of *Araki* (U.S. Patent No. 5,770,098). Applicant respectfully traverses the rejection of claim 1 for at least the following reasons.

a. There is no motivation to combine the relevant teachings of the references

"The PTO has the burden under section 103 to establish a prima facie case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references." *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988). Further, "[t]here must be some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination." *In re Oetiker*, 977 F.2d 1443, 1447, 24 USPQ 2d 1443 (Fed. Cir. 1992).

Claim 1, as previously amended, recites:

> 1. A method of reducing fluorine contamination on a integrated circuit wafer surface comprising:
> placing an integrated circuit wafer on a cathode stage wherein said integrated circuit wafer comprises a surface contaminated with fluorine; and
> treating said integrated circuit wafer surface with a plasma to remove said fluorine from said surface wherein said cathode stage is heated to a temperature to thereby increase the rate of said fluorine removal.

The Office Action (page 3) admits that *Jones* does not teach an additional limitation wherein the cathode stage is heated to a temperature, but alleges that *Araki* does. The Office Action (page 3) also alleges that "it is obvious for a person skilled in the art at the time when the invention was made to modify *Jones* to include the hot cathode taught by *Araki* since the cathode

can be heated like a resistor, and since hot electron can be generated from the cathode, the rise in charge can be done rapidly and simply." This rational, however, clearly embodies impermissible hindsight.

In this regard, Applicant submits that there is no proper motivation to modify *Jones* to include the hot cathode taught by *Araki*. In col. 15, ln. 52-55, *Araki* states the reason to heat a cathode is for ensuring "that the plasma can be generated at a low voltage of, for example, 40 to 50 volts, and thus the damage concomitant with the processing can be held to a minimum." Further, the etch process provided by *Araki* is concerned with etching contact holes (col. 1, ln. 8-11). *Araki* suggests to lower the voltage since contact holes expose underlying devices which may be or may not be well protected and therefore the plasma damage during etching those contact holes should be as low as possible. *Jones*, however, discusses nothing about plasma damage because it provides etching process for "removing residual chemicals from bonding pad surfaces."(Col. 1, Ln. 8-9) As well known by persons skilled in the art, after forming the metal layer for bonding pads, all devices in an integrated circuit have been connected according to design requirements and should be well protected from plasma damage. Generally speaking, plasma damage is not a concern for a bonding pad etching process. Therefore, since there is no problem in *Jones* about plasma damage, a person skilled in the art would not be motivated to lower the voltage by heating the cathode of *Jones* according the teaching of *Araki*. For at least this reason, the rejection should be withdrawn.

b. *Jones* further teaches away from *Araki*

Not only does Applicant contend that there is no proper motivation to combine Araki with Jones, but Applicant further submits that *Jones* teaches away from *Araki*. A *prima facie*

case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention. *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997). Col. 1, ln. 65-68 of *Jones*, in pertinent part, states "the carrier gas ... ***increases the DC bias*** which improves the ability of argon to remove the oxide, or replace the $AlOF_x$." *Jones* explicitly intends to increase the DC bias because etching bonding pads concerns nothing about plasma damage as discussed in the last paragraph. *Araki*, however, oppositely teaches to heat a cathode and therefore ***lower the voltage*** since etching contact holes is sensitive to plasma damage. According to these opposite teachings in *Jones* and *Araki*, it is impossible for a person skilled in the art to heat the cathode of *Jones* as taught by *Araki*. As such, the content of these references actually teaches away from their combination.

c. The combination of *Jones* and *Araki* will not produce the claimed invention in claim 1

Taking the teachings of *Jones* and *Araki* as a whole, the combination, even if possible, will not produce the claimed invention in claim 1. A prior art reference must be considered in its entirety. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).

Jones discloses a passivation etching process (Col. 3, Ln. 50-58) to remove dielectric and a following process to remove the fluorine-containing residue on bonding pads (Col. 3, Ln. 59 – Col. 4, Ln 28). In contrast *Araki* discloses a contact hole forming process to etch dielectric and specially leave no residue at the bottoms of contact holes (Col. 8, Ln. 11-23 and Fig. 9). Taking the teachings of *Jones* and *Araki* as a whole, a person skilled in the art would, at most, modify the passivation etching process of *Jones* according to the teaching of *Araki* in order to

reduce the formation rate of the residue on bonding pads, rather than to modify the following process for removing the residue in *Jones*. One limitation in the claimed invention in claim 1 is that "the cathode stage is heated to a temperature to thereby ***increase the rate of said fluorine removal***" and the fluorine is a contaminant or residue on a surface of a bonding pad. Therefore, the combination of *Jones* and *Araki* does not produce the claimed invention in claim 1.

According to the foregoing reasons, there is no motivation to modify *Jones* to include the hot cathode taught by *Araki*, *Jones* teaches away from *Araki*, and the combination, even if possible, does not produce the claimed invention in claim 1. Therefore, the rejection of claim 1 under 35 U.S.C. §103 should be withdrawn.

Because independent claim 1 is allowable over the prior art of record, its dependent claims 2-8 is allowable as a matter of law, for at least the reason that each dependent claim contains all features/elements/steps of its respective independent claim 1. *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988). Additionally and notwithstanding the foregoing allowability of claim 1, each of dependent claims 5, 7, and 8 recites further features and/or combinations of features (as is apparent by examination of the claim itself) that are patentably distinct from the prior art of record. Hence, there are other reasons why this dependent claim is allowable.

Dependent claim 5 defines: "the method according to claim 1 wherein said step of bombarding comprises N_2 gas." The Office Action in page 3 rejected this claim 5 by indicating that *Jones*, Col. 1, Ln. 60-65 discloses the further limitation. *Jones*, Col. 1, Ln. 60-65, however, does not. In col. 1, Ln. 60-65 (where nothing about N_2 gas is mentioned) Jones states:

> "The process of the present invention also relates to the addition of a carrier gas such as, carbon dioxide, or an inert gas, such as, helium, xenon, neon, krypton, etc. to the argon. The carrier gas enhances the plasma. The carrier gas stabilizes the

> plasma, and increases the DC bias which improves the ability of the argon to remove the oxide, or replace the $AlOF_x$."

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). As the further limitation in claim 5 is absent in the prior art of record, the Office Action does not establish prima facie obviousness of claim 5 and the rejection should be withdrawn.

Dependent claim 7 states: "the method according to claim 1, wherein said step of bombarding further comprises a reducing gas to form HF from said fluorine contamination wherein said HF is removed by said bombardment gas."

Dependent claim 8 states: "the method according to claim 7 wherein said reducing gas comprises H_2."

The Office Action in page 4 mistakenly rejected claims 7 and 8 by indicating that *Jones*, col. 3, ln. 50-55 discloses the further limitations. *Jones*, Col. 3, Ln. 50-55, in fact, does not. In col. 3, ln. 50-55, (where nothing about a reducing gas or a H_2 gas is mentioned), *Jones* states:

> "The semiconductor device is typically, passivated with a layer 6 of silicon dioxide and SiN_3O. The passivation layer 6 is then removed from the bond pad 4 areas by an etch process. Typically, the etch process is a dry/plasma etch, and is performed in fluorine containing gases, such as CHF_3."

In *Jones*, CHF_3 is used to etch the passivation layer 6 and will form fluorine contamination. It cannot "form HF from the fluorine contamination" as required by claim 7. *Jones* indeed uses an O_2 gas to remove the fluorine residue. See Col 4, Ln 14-28. An O_2 gas, nevertheless, still cannot "form HF from the fluorine contamination" as required by claim 7. Since this further limitation in claims 7 and 8 is absent in the prior art of record, the Office action

fails to establish a *prima facie* case of obviousness with respect to claims 7 and 8 and the rejection should be withdrawn.

Request for Examination of Unselected Species

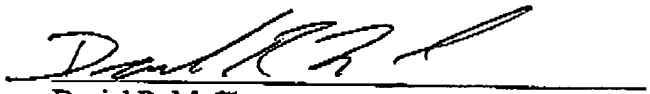
If claim 1 is allowable, Applicant respectfully request the examination of claims of unselected species since claim 1 is a generic claim among all the species of this application.

CONCLUSION

In light of the foregoing amendments and for at least the reasons set forth above, Applicant respectfully submits that all objections and/or rejections have been traversed, rendered moot, and/or accommodated, and that all pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned agent at (770) 933-9500.

No fee is believed to be due in connection with this amendment and response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 20-0778.

Respectfully submitted,



Daniel R. McClure
Registration No. 38,962

THOMAS, KAYDEN, HORSTEMEYER & RISLEY, L.L.P.
Suite 1750
100 Galleria Parkway N.W.
Atlanta, Georgia 30339
(770) 933-9500